



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,242	08/03/2001	Arne Husth	042933/304258	9112
826	7590	09/13/2006	EXAMINER	
ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000			WANG, TED M	
			ART UNIT	PAPER NUMBER
			2611	

DATE MAILED: 09/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

81

<b>Office Action Summary</b>	Application No. 09/923,242	Applicant(s) HUSTH, ARNE	
	Examiner Ted M. Wang	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5,7-12,14 and 15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,7-12,14 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10 July 2006</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. The indicated allowability of claims 1-5, 7-12, 14 and 15 are withdrawn in view of the newly discovered reference(s) to US 5,833,538. Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 7-12, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al. (US 5,579,347) in view of Townshen (US 5,835,538).

- With regard claim 1, Lindquist et al. discloses a digitally compensated direct conversion receiver (Fig.1b) having an effective characteristic (Fig.2a and column 5 lines 16-22) comprising:

determining the modulation extremes of a received modulated signal (column 8 lines 38-62, where the "r" is the amplitude of the input signal that is the modulation extremes of a received modulated signal);

determining a DC offset for the signal from the modulation extremes (column 8 line 64 – column 9 line 9, where  $p_2$  is the second order product (or DC

offset as described in equation 3) that based on the modulated extreme "r".); and processing the signal to compensate for the offset (Fig.6 element 608 and column 9 lines 21-31).

Lindquist et al. discloses all of the subject matter as described in the above paragraph except for specifically teaching applying an inverse filter characteristic to a received modulated signal to compensate for the effect of the effective filter characteristic.

However, Townshen teaches applying an inverse filter characteristic (Fig.10 element 268) to a received modulated signal to compensate for the effect of the effective filter characteristic for adjusting the parameters of decoder 156 (column 13 lines 16-22) so that the recovered signal quality is improved.

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the inverse filter as taught by Townshen into Lindquist's DSP processing between step START and step 502 so as to improve the recovered signal quality.

- With regard claim 2, Lindquist et al. further discloses determining the DC offset (Fig.2a and 2b, column 5 lines16-26, column 8 line 64 – column 9 line 9) with second order product of the input signal based on the signal amplitude by using a smoothing filter for a sliding average of four symbol periods (column 5 lines 36-61).

Lindquist et al. discloses the claimed invention except for determining the DC offset as substantially the mean of the signal amplitude at the modulation

extremes. However, as shown in Figs.2a and 2b, the ideal signal is the signal without the second-order product, and the total received signal is the sum of the ideal signal and the second product (column 5 lines 22-25). It is therefore clear determining the second order product (column 2, lines 26-52) is equivalent to averaging the signal amplitude at the modulation extreme as recited.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Lindquists' DC offset determination method with that of instant application's since determining the DC offset with second order product of the input signal based on the signal amplitude and determining the DC offset as substantially the mean of the signal amplitude at the modulation extreme are equivalent for their use in the single conversion receiver art, and the selection of any of these known equivalents to determine the DC offset of the input modulated signal would be within the level of ordinary skill in the art.

- With regard claim 3, Lindquist et al. further discloses the step of processing the signal comprises subtracting the offset from the signal (column 6 lines 21-27).
- With regard claim 7, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claims 8 and 9, Lindquist et al. further discloses the signal comprises an in-phase and a quadrature (Q) component of a modulated signal (Fig.1b elements 40 and 50 OUTPUT, I and Q, and column 4 lines 41-50).

- With regard claim 10, Lindquist et al. further discloses the signal is GMSK modulated (column 5 lines 1-15).
- With regard claim 11, Lindquist et al. further discloses a computer program which, when run on a processor, carries out the step of claim 1 (Fig.1b element 130, column 4 lines 41-59, equations 4-8, and column 9 lines 6-21).
- With regard claim 12, which is a receiver mean plus function claim related to claim 1, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 14, Lindquist et al. further discloses a program to be executed by a digital signal processor (Fig.1b element 30, column 4 lines 41-59, equations 4-8, column 6 lines 21-55, and column 9 lines 6-21) in a direct conversion receiver (Fig.1b and column 4 lines 41-45), the receiver comprising a mixer circuit (Fig.1b elements 40 and 50) for providing quadrature related signals from a received modulated signal (Fig.1b elements I and Q and column 4 lines 41-49), a DC cancellation circuit for canceling the DC component in the quadrature related signals and a digital signal processor for removing a residual DC component from the signals (Fig.1b element 30 and column 6 lines 21-55). All other limitation is contained in claim 11. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 15, which is a receiver claim related to claim 1, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.

Art Unit: 2611

4. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lindquist et al. (US 5,579,347) and Townshen (US 5,835,538) as applied to claim 1 above, and further in view of the admitted prior art of the instant application.

- With regard claim 4, Lindquist et al. and Townshen disclose all of the subject matter as described above except for specifically teaching the step of processing the signal comprises subtracting a weighted exponential function from the signal.

However, the admitted prior art of the instant application teaches that the step of processing the signal comprises subtracting a weighted exponential function from the signal (page 1 lines 23-31). Where the admitted prior art of the instant application teaches a DC cancellation circuit (DCN) designed as high pass filters (page 1 line 29), in which capacitors can be rapidly charged/discharged during the DCN period by electronic switching circuits, to obtain a subtraction of the DC offset in each I or Q channel (page 1 lines 29-31). It is well known in the art that the high pass filter characteristics leads to the DC component being a declining exponential function, so that DCN is performed by subtracting a weighted declining exponential function from I/Q samples.

In general, for a high pass filter, each half-cycle the *R-C* circuit behaves like a simple direct current (d.c.) *R-C* circuit, because the input voltage is equal to a constant voltage, given by  $V_{in}$ . The voltage ( $V_{out}$ ) for a charging capacitor across the capacitor can be obtained by the following equations:

$$q(t) = CV_{in}(1 - e^{-t/RC})$$

$$V_{out} = \frac{q}{C}$$

$$V_{out} = V_{in}(1 - e^{-t/RC})$$

As shown in the above equation, it indicates that the high pass characteristics to the DC component being a declining exponential function, so that compensation is performed by subtracting a weighted declining exponential function from the I/Q samples.

It is desirable to have the DC cancellation circuit (DCN) disclosed by the admitted prior art of the instant application in order to reasonably estimate and eliminate the DC offset in later process so that the received signal can be substantially free from distortion. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by the admitted prior art of the instant application, in which, implementing subtracting a weighted exponential function from the signal, into Lindquist and Townshens' DC cancellation process in order to reasonably estimate and eliminate the DC offset in later process so that the received signal can be substantially free from distortion.

- With regard claim 5, Lindquist et al. and Townshen disclose all of the subject matter as described above except for specifically teaching wherein the weighting of the exponential function comprises the determined DC offset.

However, the admitted prior art of the instant application teach a DC cancellation circuit (DCN) designed as high pass filter characteristics to the DC component in which capacitors can be rapidly charged/discharged during the



DCN period by electronic switching circuits, to obtain a subtraction of the DC offset in each I or Q channel (page 1 lines 29-31).

It is desirable to have the weighting of the exponential function comprises the determined DC offset in order to reasonably estimated and eliminated the DC offset in later process so that the received signal can be substantially free from distortion. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by the admitted prior art of the instant application, in which, have the weighting of the exponential function comprises the determined DC offset, into Lindquist and Townshens' DC cancellation process in order to reasonably estimated and eliminated the DC offset in later process so that the received signal can be substantially free from distortion.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M. Wang

A handwritten signature in black ink, appearing to be 'Ted M. Wang', written over the printed name.

Ted M Wang  
Examiner  
Art Unit 2611